Displaying Web Content in iPhone Applications

UIWebView

Session 124

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Displaying Web Content in iPhone Applications

UIWebView

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UIWebView

Displaying rich text and web content in your application

In This Session:

- What is UIWebView?
- Using UIWebView
- Best practices
- Advanced topics
- What's new in iPhone OS 3.0

What Is UIWebView?

Rich content in your application

The Challenge

Text presentation on the iPhone

- The basics:
  - UILabel
  - UITextField
  - UITextView
  - NSString (UIStringDrawing)
- Single font
- Single color

- Fine for many uses, but sometimes you just need style…

The Challenge

My document—I just want to look at it!

- Need to display documents
  - PDF
  - iWork
  - MS Office

- Being able to view these documents is a must…but how?

The Challenge

A World Wide Web of content

- The Internet has immense resources that can enhance your app

- Option: Exit to Safari

- Not the greatest user experience…

The Challenge

I already have this great web app…

- But it can’t access native functionality
  - UIKit
  - Address book
  - Accelerometer
  - MapKit
  - And more…

- You don’t want to start over, you want to enhance what you have…

The Solution: UIWebView

UIView

variety of content types

asic browsing

y WebKit

WebKit

A rendering engine

- Content types:
  - HTML
    - CSS
    - JavaScript
  - PDF

- Want styled text in your app? Just use HTML

UIWebView Adds Documents

- UIWebView converts to HTML
- WebKit renders
- UIWebView displays the results
- Supported types include
  - iWork ’06 and newer
  - MS Office ‘97 and newer
  - RTF and RTFD

UIWebView, the Solution

When to use UIWebView

- Displaying styled content
- Showing document previews
- Embedding web resources
- Extending web apps with native functionality

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Using UIWebView

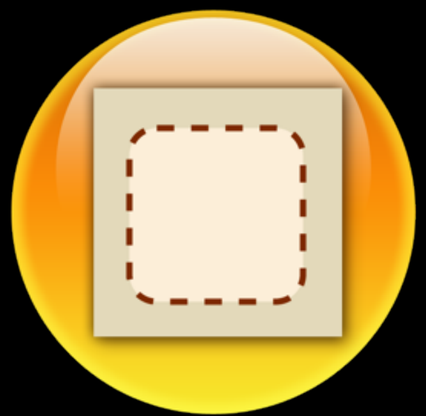
Putting UIWebView to work

Design Patterns

The players

UIWebView

UIView subclass that renders web content



<UIWebViewDelegate>

Controller object in your application
Tracks content loading in the web view

Design Patterns

Supporting roles

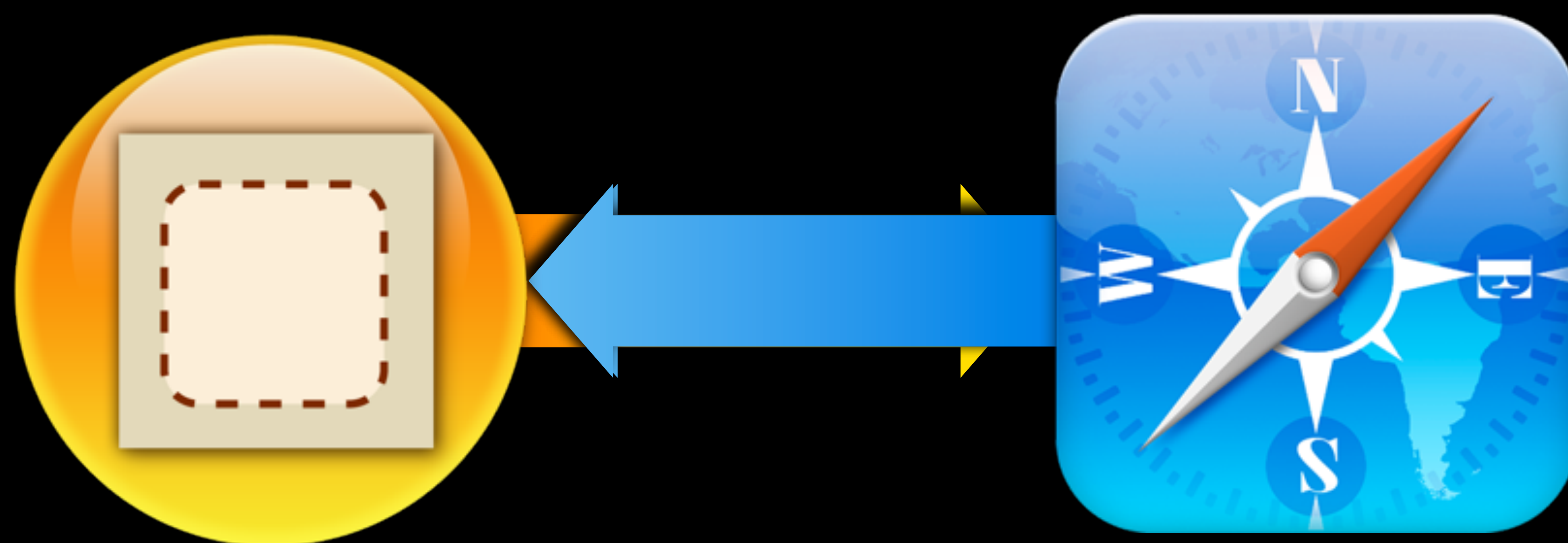
URLs

HTML

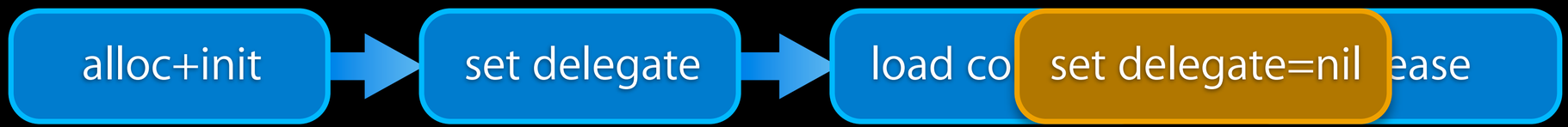
JavaScript

How They Interact

[illegible]
(handle errors here)



Life Cycle

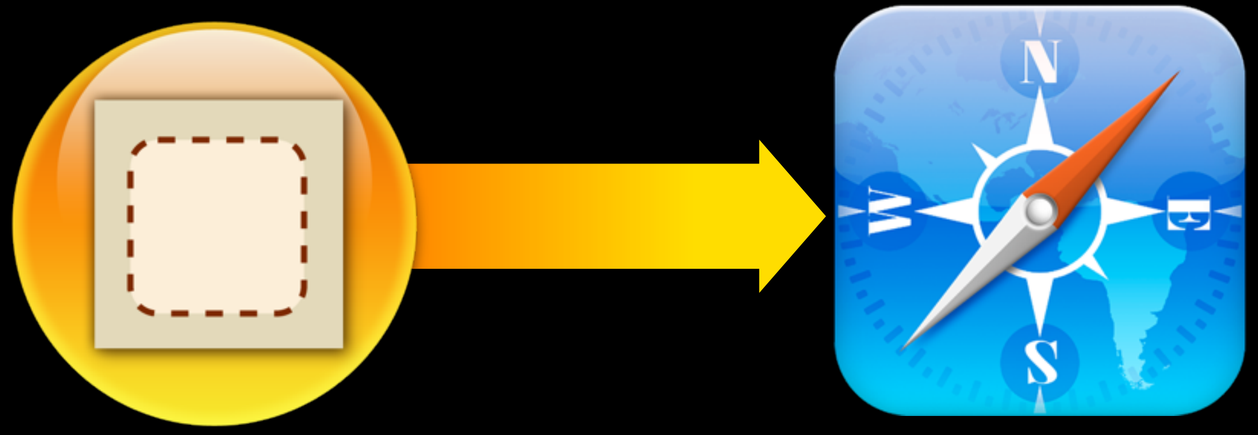


Setting the web view delegate to nil before releasing is essential!

Communicating with Content

From Objective-C to JavaScript

- How can native code trigger JavaScript?



stringByEvaluatingJavaScriptFromString:

Communicating with Content

From JavaScript to Objective-C

- When would you want to do this?
- Native functionality in AJAX callbacks
- No explicit API, but…
- Hook into the delegate method:

```
webView:shouldStartLoadWithRequest:navigationType:
```

Communicating with Content

From JavaScript to Objective-C

- Create a URL with a dummy host
- Use the URL path to specify a command
  - http://my_javascript/my_command
- In JavaScript, "load" a URL with this host:

```
function invoke_objective_c() {
    window.location = "http://my_javascript/my_command";
}
```

Communicating with Content

From JavaScript to Objective-C

- In the delegate, test the URL:

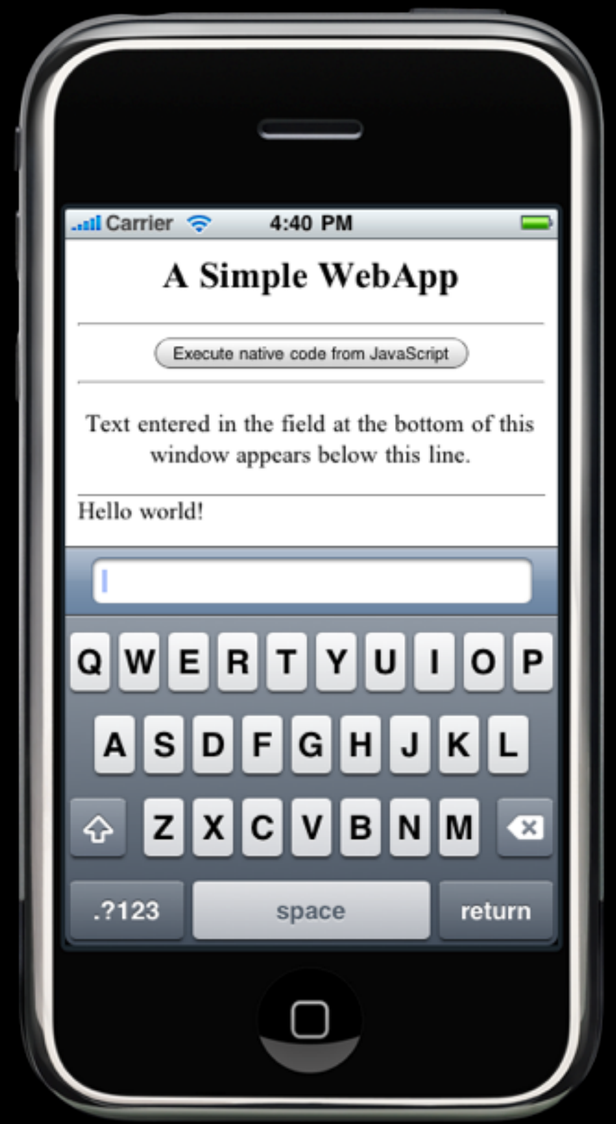
```
NSString *host = request.URL.host;
if ([host isEqualToString:@"my_javascript"]) {
    NSString *command = request.URL.path.lastPathComponent;
    if ([command isEqualToString:@"my_command"]) {
        // do something
    }
}
```

Putting UIWebView to Work

- UIWebView, UIWebViewDelegate
- Message flow
- Set delegate=nil before releasing!
- Objective-C to JavaScript
- JavaScript to Objective-C

What We'll Build:

- Embedded HTML content
- Native components
  - UIWebView
  - UIToolbar
  - UITextField
- HTML button executes native code
- Text entry executes JavaScript



Demo

Building a simple hybrid application

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Best Practices

Getting the most out of UIWebView

Right Tool, Right Job

Using UIWebView wisely

Rendering Engine vs. Browser

What does it take to build a complete browser?

	WebKit on Mac OS X	UIWebView on iPhone OS
Classes	125	1
Protocols	27	1
APIs	> 1000	20

UIWebView

Lightweight presentation layer over WebKit

- Optimized for displaying styled content
- Works best with known content
- Avoid general browsing

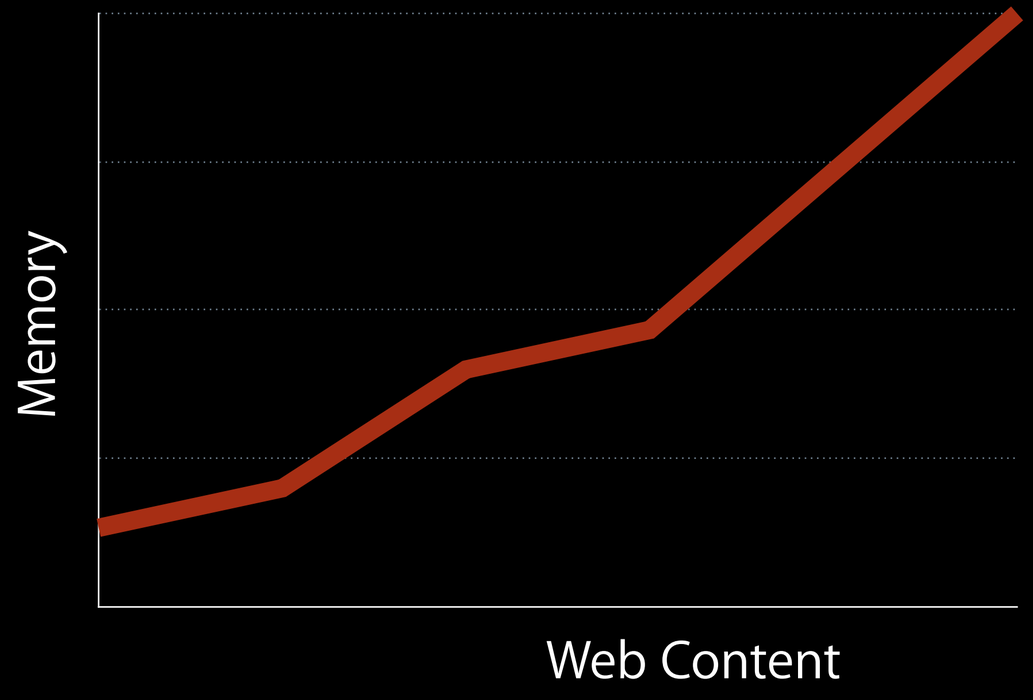
```
webView:shouldStartLoadWithRequest:navigationType:
```

Memory Consumption

- Requires significant resources
- Web pages have no size limit
- Memory consumption is dictated by content size
- Data may be cached internally

Multiple Web Views?

- More web content = more memory used



- Be conservative in your use of web views

JavaScript

- Scripts should be fast
  - Must finish within 10 seconds
  - Break longer scripts into pieces
- Power consumption
  - Network activity is expensive
  - Avoid rapid polling with AJAX
  - Where possible, batch data transfers together

Threads

- Access on main thread ONLY!
  - *Just like all other UIViews*
- Background threads are used to:
  - Download
  - Render
  - Set delegate = nil before release
- Won’t block your main thread

Getting Touch Events

Should I subclass UIWebView?

- Internal view hierarchy is PRIVATE
- Event handling is complex
  - "Forwarding" events is not supported
    - Don't directly invoke UIResponder touches methods

- Summary: Subclassing UIWebView is strongly discouraged

Getting Touch Events

A better way…

- Observe events at the window level for native logic
  - Subclass UIWindow
  - Override sendEvent:
  - Always invoke [super sendEvent:]

- Use JavaScript event handling for content-related interactions

Demo

Getting touches in a web view

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Advanced Topics

Pushing the envelope

Advanced Topics

- Using NSURLConnection
- Handling HTTP authentication
- Links that open in new windows
- Saving and restoring state
- Offscreen rendering

NSURLConnection

Downloading content directly

- Foundation level API
- Has synchronous and asynchronous modes
  - Synchronous connections BLOCK!
  - Use asynchronous instead
- Configure with a URL Request
- Delegate tracks loading and responses

- Fundamental for many advanced use cases…

HTTP Authentication

- You can embed authorization information in URLs
  - https://user:pass@www.myprotectedsite.com/
- Presenting a UI for authentication:
  - Use a separate URL Connection
    - connection:didReceiveAuthenticationChallenge:
    - NSURLCredentialPersistenceForSession
  - Web view will use cached credentials

Links That Open Windows

- UIWebView ignores links that open new windows
  - target=_blank
  - window.open()
- Easiest solution:
  - Don’t use this functionality in your content
- More difficult:
  - Download content
  - Modify links to open in same window
  - Then load with web view

Saving and Restoring State

- Easiest when you control content
  - Keep CSS and JavaScript inline
  - Minimize external resources
- Download content with NSURLConnection
- Load into web view
- On UIApplicationWillTerminate, save to file
- At launch, if file exists, load content

Offscreen Rendering

Creating an image representation of web content

- Load content in a web view
- UIGraphicsGetImageFromCurrentImageContext

- Challenges:
  - UIWebView won't render unless it's in a window
  - Drawing is asynchronous

Demo

Offscreen rendering

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What's New in iPhone OS 3.0

Welcome to the future…

What's New in iPhone OS 3.0

Copy / Paste

- Built into UIWebView
  - Standard behavior "for free"

- Disable selection by using CSS:

```
-webkit-user-select:none;
```

- Avoid universal disabling of selection
  - Only disable for specific elements

What's New in iPhone OS 3.0

Data Detectors

- Automatically convert data to clickable URLs

```
@property (nonatomic) UIDataDetectorTypes dataDetectorTypes
```

  - Phone numbers
  - Links
  - None
  - All—automatically adds future types without recompile

- Use instead of detectsPhoneNumbers property

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More Information

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Documentation

UIWebView Class Reference
UIWebViewDelegate Protocol Reference
NSURLConnection Class Reference
URL Loading System
http://developer.apple.com/iphone

Related Sessions

Sophisticated Media Playback and Animation Through Open Web Standards	Mission Wednesday 3:30PM
Local Data Storage and Offline Web Applications for Safari	Russian Hill Thursday 3:30PM

Labs

iPhone Web Applications Lab	iPhone Lab A Wednesday 5:00PM
Media Playback in Web Applications Lab	OS X Lab C Thursday 10:30AM
Local Data Storage and Offline Web Applications Lab	OS X Lab A Thursday 5:00PM

Q&A

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